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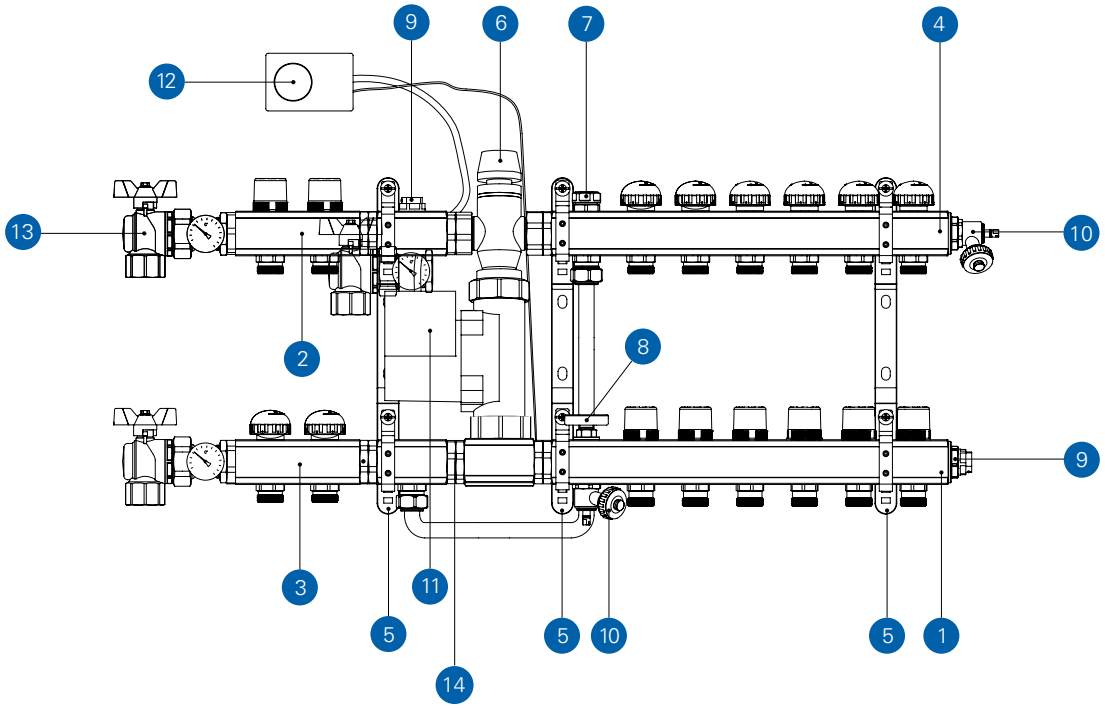
Floor Mixing Unit Installation and Commissioning Instructions

1. Description

The floor mixing unit is a pre-assembled manifold designed for underfloor heating systems with an integrated thermostatic mixing valve, available from 2 to 12 ways. It has a choice of either lockshield valves or flowmeters and is available with or without a pump. High temperature circuits (such as radiators or towel rails) can also be added as shown using optional kits, available from 2- 12 ways, with lockshield valves.



1.1 Components

1. Flow bar for underfloor heating system with double regulating lock-shields. Versions with double regulating flowmeters are also available.
2. Flow bar for radiator system with 2 to 12-way double regulating lockshields, using optional kits 01292316 - 01292336, 2-12 ways.
3. Return bar for high temperature circuits with built-in valves ready for electrothermic heads (available separately) using optional kits 01292316 - 01292336, 2-12 ways.
4. Return bar for underfloor heating systems with built-in valves ready for electrothermic heads (available separately).
5. Offset mounting brackets, 210mm centres.
6. 3-port thermostatic mixing valve.
7. Return balancing valve.
8. Temperature gauge, range from 0 to 80°C
9. Manual air vent ½".
10. Drain and filling valves with rotatable connection and safety cap.
11. Circulating pump, Grundfos UPS 25-60, optional
12. Adjustable over-temperature thermostat with wiring box, range 30°C to 90°C with off switch position
13. Ball valve kit with or without temperature gauge pipe unions in straight or angled pattern.
14. Internal blanking plug.

1.2 Technical Data

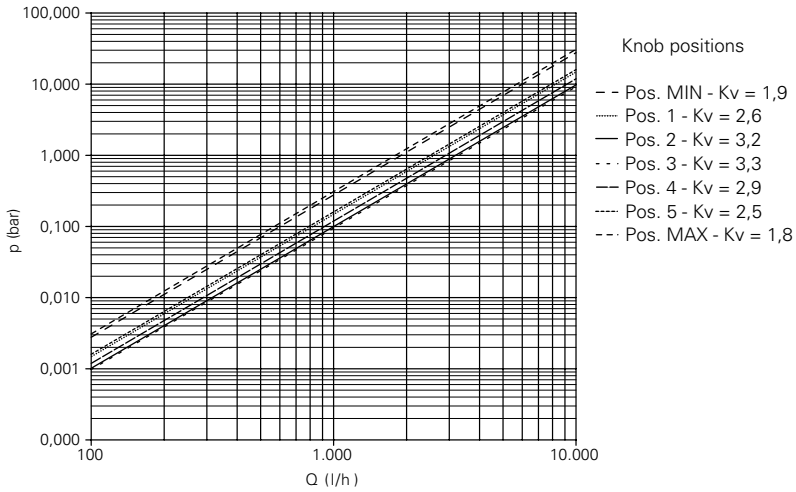
Max. temperature on primary circuit	85 °C
Maximum operating pressure	10 bar
Graduated scale. Thermostatic mixing valve	min-1-2-3-4-5-max
Temperature range adjustment, mixed water	25 °C -55 °C*
Kv mixing valve	1.8 -3.3 (min -max)
Temperature gauge range	0 -80 °C
Maximum thermal capacity available to secondary **:	15000 W (ΔT = 10 °C) 11000 W (ΔT = 7 °C) 8500 W (ΔT = 5 °C)
Circulator pump connection	pipe unions 1"1/2 port-to-port dimension 130mm
Manifold size	1"
Primary connections	G1"
Manifold connections	M 24x19

* Nominal conditions: TH = 65 °C, TC = 15 °C, PH = PC = 3 bar Qmix = 720 l/h

** Test conditions: group with Grundfos UPS 25-60 circulation pump Emmeti, connected to open manifold, Δp secondary = 0.22 -0.25 bar

1. Description

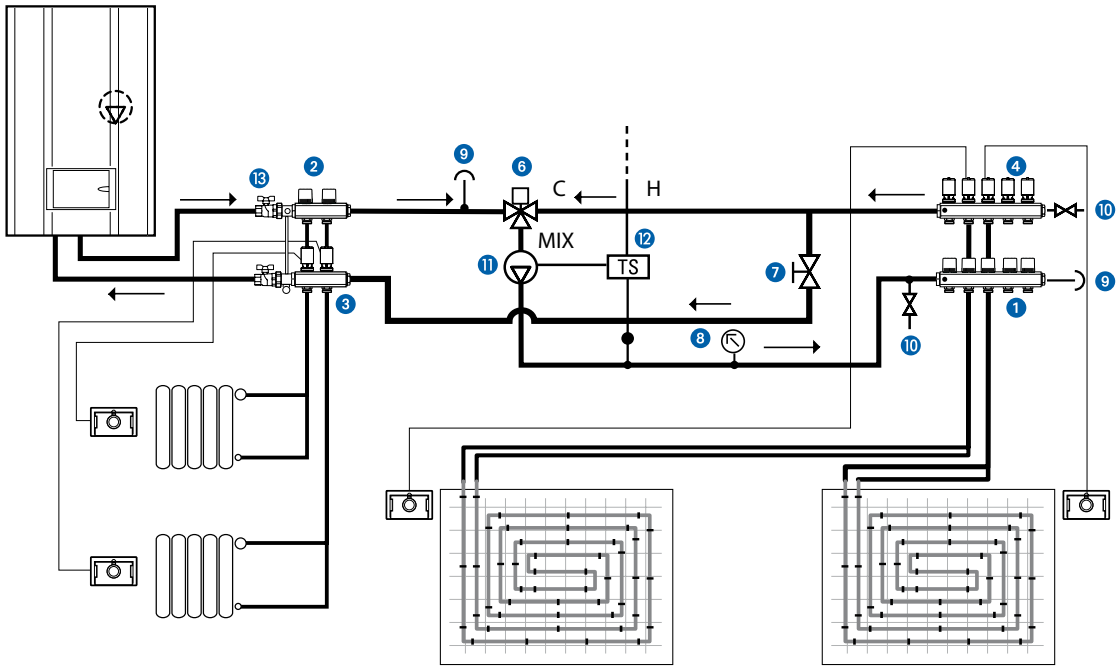
1.3 Pressure drops thermostatic mixer



Nominal conditions: T_H = 65°C; T_C=15°C; $P_{H\text{-}MIX} = P_{C\text{-}MIX}$

Knob positions	Min	1	2	3	4	5	MAX
Temperature °C	-	25	33	36	43	55	-

1.4 Schematic System Diagram



The numbers refer to item 1.1 on previous page.

2. Installation

2.1 Assembly Installation

Floor Mixing Units can be wall-mounted using the brackets provided with screws and plugs suitable for the mounting surface(see Fig. A). Alternatively it can be mounted in Emmeti cabinets suitable for a depth of not less than 130mm (see Fig. D).

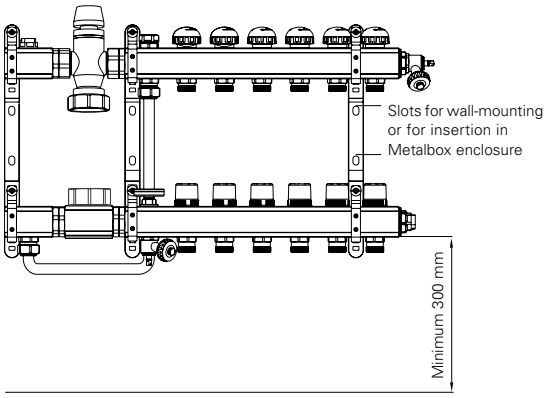


Fig. A

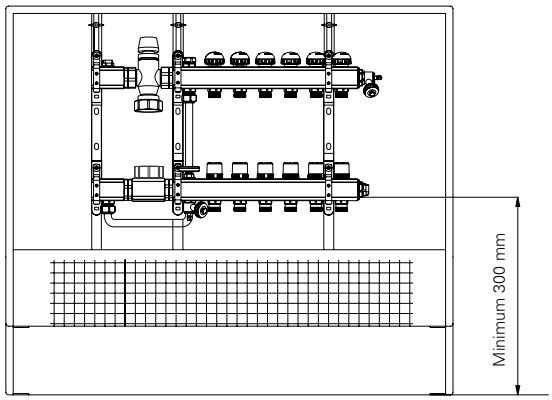


Fig. B

For proper selection of the Metalbox enclosure, check overall clearances (see figs. C, D, E, F, G, H, I) needed for the Floor Mixing Unit including circulation pump and any other accessories such as the high temperature accessory kit, Progress kit with bypass, 1/2" terminal kit with bypass, etc.).

Note: to install a 1/2" terminal kit c/w bypass, onto the right hand end of the manifold set, unscrew and remove the drain/fill valve from the end of the top rail, and the manual air vent valve from the end of the bottom rail; then install the kit by screwing the 1/2" M bridging t-piece connectors onto the end of the manifold set. Re-attach the drain/fill valve and manual air vent valve onto the 1/2" F connections available on the bridging t-piece connectors.

2.2 Dimensional Data

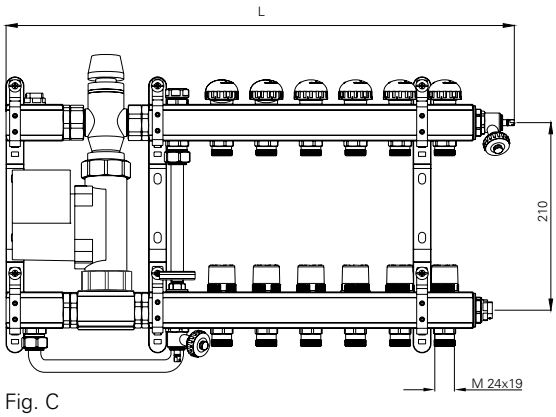


Fig. C

Fig C, no. of ways	L
2	368
3	418
4	468
5	518
6	568
7	618
8	668
9	718
10	768
11	818
12	868

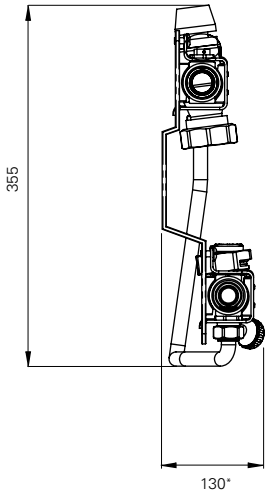


Fig. D

* With Grundfos 25-60 circulation pump installed with control box positioned as shown in Fig E.

2. Installation

Circulation Pump Grundfos UPS 25-60

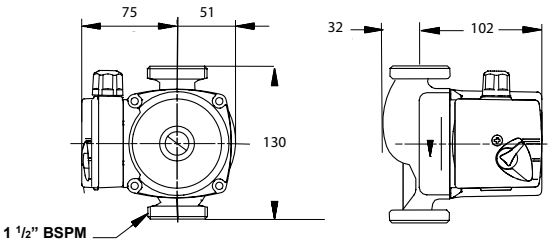


Fig. E

High temperature accessory kit

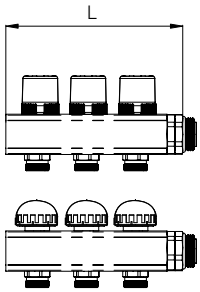


Fig. F

Model	L
2-way	130
3-way	180
4-way	230
5-way	280
6-way	330
7-way	380
8-way	430
9-way	480
10-way	530
11-way	580
12-way	630

Progress ball valve kits with differential pressure by-pass valve

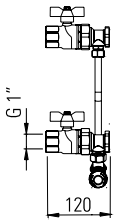


Fig. G

Progress ball valve kits

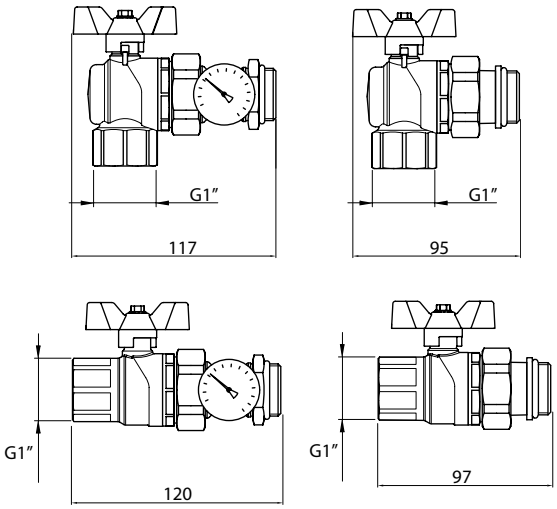


Fig. H

1/2" terminal kit with bybass for Floor Mixing Unit

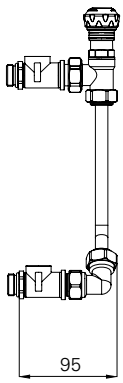


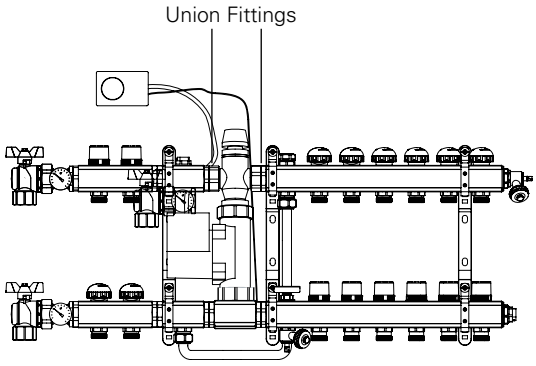
Fig. I

2. Installation

2.3 Circulation pump assembly

On the Floor Mixing Unit group, install a circulation pump Emmeti Shark N 6/53 (or one of equivalent performance and dimensions), with rubber gaskets. Connect the pump using the 1 1/2" threaded union nuts provided, using the rubber gaskets. The outlet port of the circulation pump must face downwards (Fig. E).

Note
For installation in a Metalbox manifold cabinet, please ensure that the overall depth inside the cabinet is greater than the overall depth shown in Fig. D. The pump should be installed with the junction box at the front and the pump outlet downwards. The mixing valve has unions at each side (see below) to allow the mixing valve to be moved and the pump to be fitted.



2.4 Electrical connections

The Domestic Building Services Compliance Guide recommends the use of 'a separate flow temperature high-limit thermostat' for systems connected to a high temperature water supply (i.e. more than 60°C) to ensure that the water temperature in an underfloor heating system does not rise above the temperature recommended for the floor. Emmeti UK offer a thermostat for this purpose, code: 28130632.

Emmeti UK also offer the EWC-1 wiring centre designed specifically for the connection of electrical components in underfloor heating systems:

Code U9360010 - EWC-1 230V 8-way wiring centre with on-off switch

Code U9360020 - EWC-1 24V 8-way wiring centre with on-off switch

This allows the connection of the mains power supply, thermostats and actuators with electrical interlock terminals for the boiler and manifold pump as required by Building regulations.

Full instructions are provided with both items.

Please ensure that the electrical wiring of the installation and connections to and from electrical system components are in accordance with BS 7671, the latest edition of the IEE Wiring Regulations.

High limit thermostat, code: 28130632
Wall Mounting - Install the high limit thermostat adjacent to the Floor Mixing Unit where the thermostat phial can be trapped between the rubber mounting pad in the support bracket and the surface of the flow manifold, fixing it to the wall with screws and plugs.

Cabinet mounting - Where the Floor Mixing Unit is installed in a Metalbox manifold cabinet, install the thermostat in the enclosure above or to the side of the manifold assembly as shown in Fig. M.

Make the electrical connections to the thermostat as shown in the installation leaflet

Maximum suggested thermostat setting: 45/50 °C for cement slabs; for other materials refer to the maximum values as stated by the supplier, and not more than 55 °C (EN 1264-4).

EWC-1 wiring centre, codes: U9360010, U9360020
Wall mounting – Install the wiring centre adjacent to the Floor Mixing Unit so that the electrical cables from the electrothermic heads can reach the wiring centre, ideally on the lower face of the centre, then fix the centre to the wall using the screws and plugs supplied.

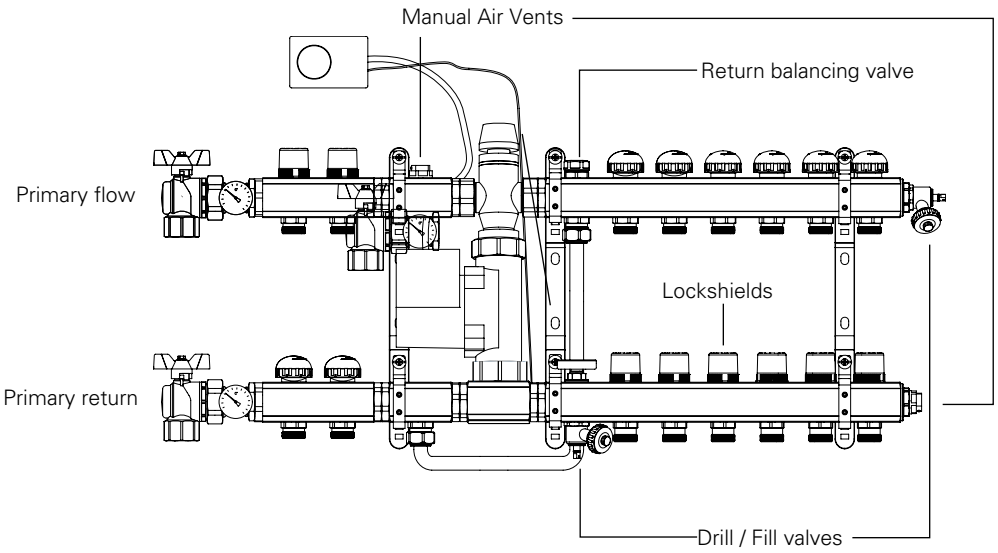
Cabinet mounting – where the Floor Mixing Unit is installed in a Metalbox manifold cabinet, the wiring centre can be installed above or to one side of the manifold providing all electrothermic head cables can reach the centre.

Make the electrical connections to the centre as shown in the installation leaflet.

2. Installation

2.5 Hydraulic connections

Connect the primary flow and return pipes and each of the individual circuits, as shown in the example below.



2.6 Filling and testing

The manifolds are provided with double regulating valves supplied fitted with either lockshields or flowmeters as standard and a return balancing valve in the closed position.

Open them before filling the system.

For filling, use the adjustable drain/fill valves with 3⁄4" connection located at the beginning of the low temperature flow rail, and at the end of the low temperature return rail, letting out the air contained inside the system by means of 2 manual air vent valves and the drain and filling valve located on the low temperature return rail. First check that return balancing valve, component 7 on page 2, is completely open. If it is not, open by turning the nut under the cap using a 10mm socket. Please make sure you compeletly open the balancing adjustment screw in the centre of the nut, using a screwdriver.

We recommend filling each circuit separately, opening the relative valves and double regulating valves each time and closing them again when the operation is completed.

The following commissioning instructions show separately the different procedures for setting up the designed flow rate using either lockshields or flowmeters

3. Balancing and Adjustment of the System

3.1 Double regulating lockshield adjustment

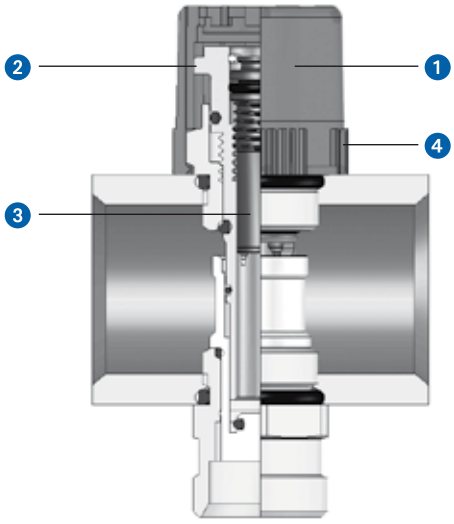


Fig. J

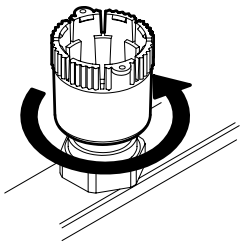


Fig. K

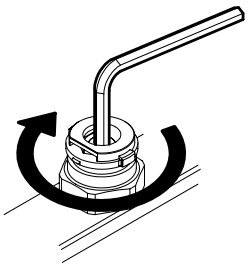


Fig. L

Emmeti have evolved a new and superior lockshield design. This allows easier, quicker and more accurate onsite setting of the correct flow. It is more accurate at maintaining the correct low flow, when set to a small aperture. This lockshield can be upgraded on site to become an integrated flow meter and lockshield.

How to balance using the lockshield:

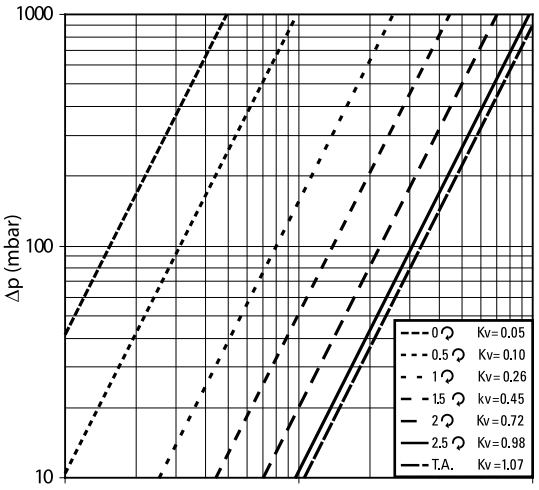
Remove the red cover **1**. The black plastic assembly underneath has an inner sleeve, and an outer sleeve. The outer sleeve is used for isolating the valve, actuated using the impression in the top of the red cover. The inner sleeve is used to balance the circuit, increasing or decreasing the flow by using a 4mm allen key, placed in the hexagon recess in the centre. The valve is supplied in the fully isolated position (flow is closed). First fully open the circuit. Turn the red cover over,and using the top, turn the outer (isolating) sleeve **2** anticlockwise, until the circuit is fully open, rotate until you feel steady resistance, then stop. Then rotate back half a turn.To verify, you will have seen theblack plastic assembly rising. Then, using the 4mm allen key placed in the hexagon recess, rotate the inner (balancing) sleeve **3** clockwise. To verify you will have seen the inner sleeve falling. Rotate until you feel a strong resistance,then stop. Rotate back half a turn. The lockshield is now ready for flow setting.

NOTE: Make sure you do not leave the inner (balancing) sleeve in the fully open posistion, back it off half a turn to be sure the o-ring is not stressed.

Using the graphs below (3.2) you can calculate the number of turns required to reach your chosen flow rate. Now start to open the inner (balancing) sleeve anticlockwise, by the number of turns you have calculated. Then stop. It is now set. Replace the red cover. To prevent tampering, you can seal the red cover into position, using wire and a lead seal, making use of the 2 holes in fins **4** on the red cover.

3.2 Diagrams of manifold with double regulating lockshield

Pressure drops (electrothermic valve* + lockshield valve)



* valve fully open

TA = All open. The above values refer to water temperature 15 °C.

Δp = p one way + p return;

= no. of turns for inner (balancing) sleeve

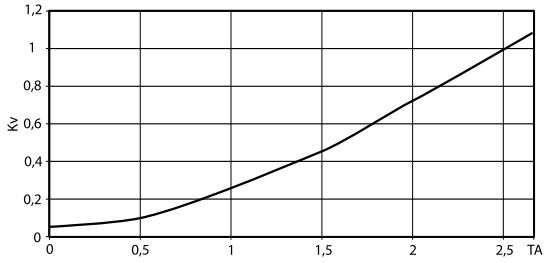
Calculation methods:

How to calculate the Δp pressure drop with a 200 l/h Q water delivery capacity determined by the valve and lockshield, with 2,5 turns opening of the inner (balancing) sleeve.

1° Method: Use the pressure drop diagram
Q = 200 l/h Δp = 40 mbar
where Kv stands for Q delivery capacity in m^3/h corresponding to Δp equalling 1 bar: $Kv = Q/\sqrt{\Delta p}$
The relationship between (bar)Δp (m^3/h) and Q de capacity is as follows: $\Delta p = Q^2 / Kv^2$

2° Method: Use the Kv diagram Kv = 0.98 Q = 0.2 m^3/h
$\Delta p = 0.2^2 / 0.98^2 = 0.04$ bar

KV values at different openings (electrothermic* and lockshield valve)



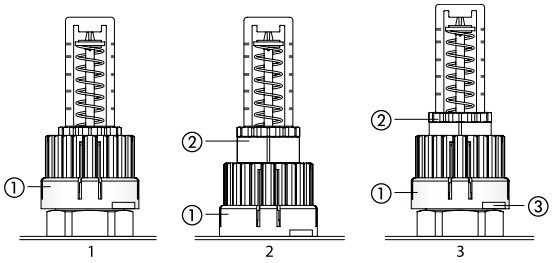
TA: Fully open.

The values are obtained with a water temperature of 15°C.

* valve fully open

3. Balancing and Adjustment of the System

3.3 Adjustment of double regulating valve with built-in flow rate measurement device (if applicable)



Range of measurement	0-4 l/min
Maximum operating pressure	6 bars
Max. operating temperature	90 °C
Kv = 0.15 (1 l/min) -0.55 (4 l/min)	
Kv max off scale	= 0.9
Precision	±10% **fs**

fs= Bottom of scale

How to balance the circuits using flowmeters

The internal construction has an inner sleeve, and an outer sleeve. The outer sleeve **4** is used for isolating the valve, actuated by raising the white sleeve **1** to engage. The inner sleeve is used to set the flow in the circuit, increasing or decreasing the flow by using the provided 19 mm spanner flats provided **2**. The change in flow can be read in the scaled window. The valve is supplied in the fully isolated position (flow is closed). First fully open the circuit as described below:

Lift the white sleeve **1**. Turn the white sleeve anticlockwise. This moves the outer (isolating) sleeve anticlockwise, operating only the isolation function, opening the circuit. Continue until fully open. To verify, you should see the whole of the flow meter rotating and rising. Stop when the resistance is strong.

You are now ready to use the flow setting function. Then rotate back half a turn, to reduce stress on the o-ring stop.

Carry this out under flow conditions. Lower the white sleeve **1**. Using a 19mm spanner, or your fingers, adjust the flow using the black spanner flats **2**. You can read the required flow in litres per minute directly from the red indicator against the scale in the clear flow meter housing. When you have achieved the desired flow rate, raise the white sleeve **1** again, until it is engaged against the black spanner flats **2**.

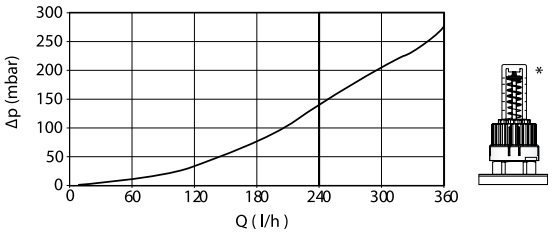
You can seal the white sleeve into position, using wire and a lead seal, or product code 01306320 red circuit indicator bands, see the end of this section or our Technical Product Guide section 5, 'Manifold Accessories'.

If you are using lead and wire, make use of the 2 holes in the white sleeve **3**.

Cleaning the window:

Turn the white sleeve **1** clockwise, until the outer sleeve isolating function is fully closed. Remove the window housing by securing the black spanner flats 2 (inner sleeve), then using either hand pressure or a 17mm ring spanner, gently unscrew the window housing anticlockwise. Clean the window and screw it back on. Turn the white sleeve 1 anticlockwise until the isolating facility is fully open again.

Flow rate measuring device pressure drops



* completely open

3. Balancing and Adjustment of the System

3.4 Adjustment of return balancing valve

The function of this valve is to adjust the total flow of water through the manifold. When it is fully shut, no water can pass through the valve into the primary return.

In order to ensure that the mixing valve operates correctly within its temperature setting range, the valve must be at least partially open. The position of the valve should be determined by using the tables shown at right. Adjust as follows:

Unscrew and take off the cap **1**

Using a 10mm socket, screw in the valve clockwise until it is fully closed.**2**

Use a screwdriver to screw in the adjustment screw completely, until it stops **3**

The valve is now ready for setting.

Unscrew the adjustment screw **3** by the desired number of turns using the screwdriver.

Open the valve **2** using the socket key in order to raise the shutter **4**; the adjustment screw will stop the shutter when it reaches the set position.

Screw the cap back **1** on.

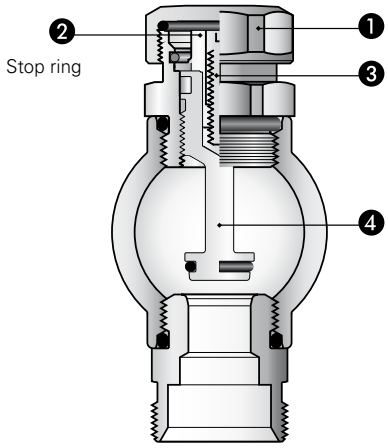
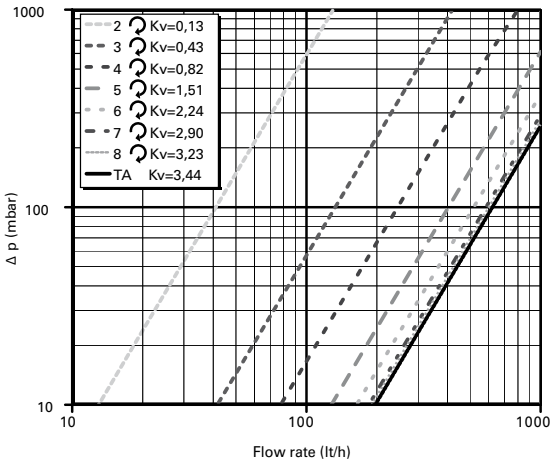


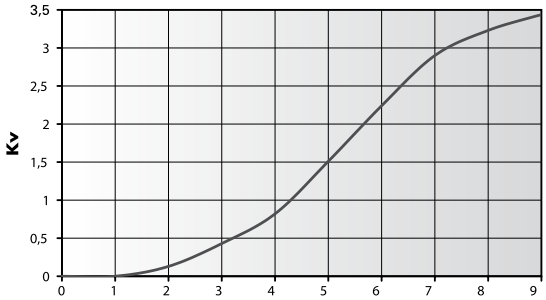
Fig. M

Pressure Drops (return balancing)



Curves 2-7 indicate the number of turns open of the valve
TA is fully open
All values are measured at a water temperature of 15°C

Kv Values (return balancing valve)

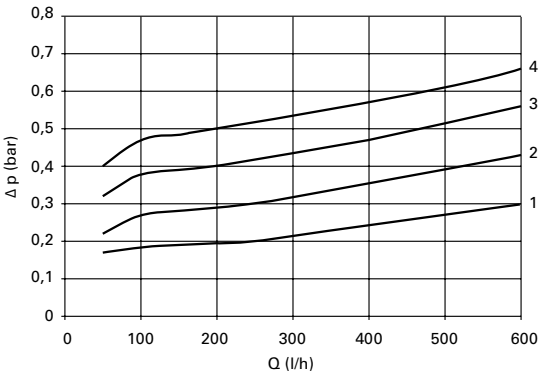


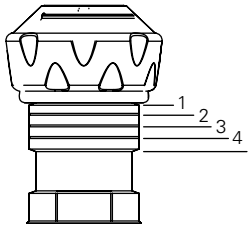
no. of opening turns of the valve adjustment screw

3. Balancing and Adjustment of the System

3.5 Balancing of the differential by-pass kit

- Kit Progress c/by pass: calibrate the differential value based on the maximum pressure drop and the maximum flow rate established for high temperature.
- Kit Terminal c/by pass: calibrate the differential value based on the maximum pressure drop and the maximum flow rate established for low temperature.





3.6 Adjustment of the thermostatic mixing valve

Adjust the temperature of the mixed water for the low temperature system by turning the thermostatic mixing valve knob (component 6 on page 2) in the direction of the coloured arrows on the upper disk (red arrow to increase temperature, blue arrow to decrease). With the system at full operating capacity, check the temperature reached using the temperature gauge on the flow manifold (component 8, figure on page 2), and make any corrections using the knob to reach the required value.

Caution

N.B. Heating of the floor system can occur only after curing of the slab (minimum 28 days for cement slabs). Before installing flooring, it is necessary to start the system with a water temperature of 25 °C, to be maintained for 3 days.
Then increase by 5 °C every 3 days until reaching a temperature of 50 °C, which is to be maintained for at least 4 days.

Temperature difference*: to change the ΔT of the low temperature floor system, you can use the speed selector of the circulation pump and also the return balancing valve (component 7, on page 2). To increase the ΔT reduce the operating speed of the circulation pump. To decrease the ΔT increase the operating speed of the circulation pump and as necessary partially close the by-pass valve (see section 3.4).

* To determine the secondary return temperature, it is advisable to install Tee thermometer holders M-F 24x19, with corresponding temperature gauge, on the connections M 24x19 of the return manifold or (only for Floor Mixing Unit without high temperature 2 or 3 way accessory kit) install the Progress kit with thermometer holder and temperature gauge.